FIG. 1

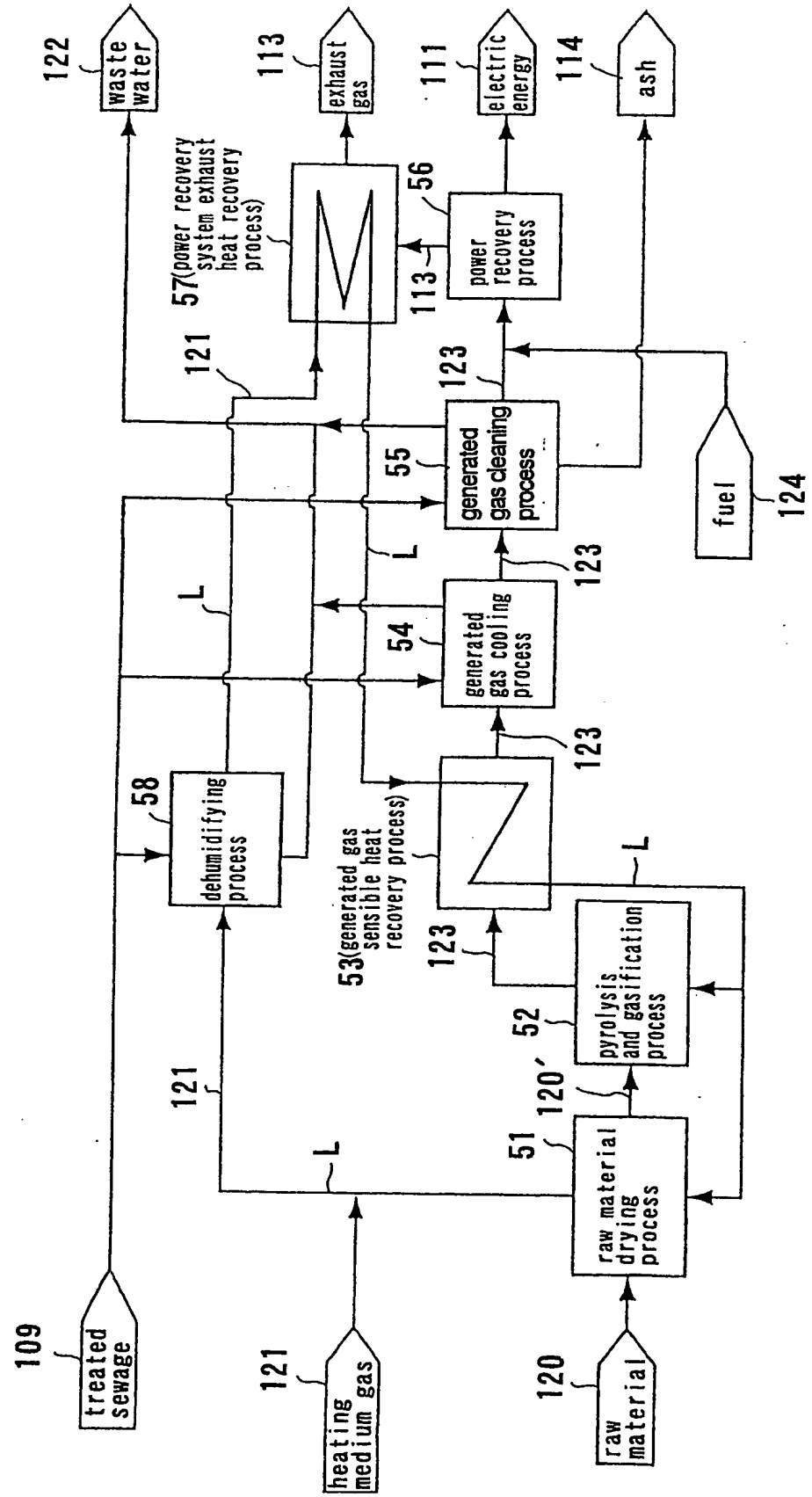

122
waste water
113
exhaust gas
111
electric energy
114
ash
57(power recovery system exhaust heat recovery process)
56
power recovery process
113
121
123
generated gas cleaning process
55
fuel
124
L
54
generated gas cooling process
123
58
dehumidifying process
53(generated gas sensible heat recovery process)
123
L
121
52
pyrolysis and gasification process
120'
51
raw material drying process
109
treated sewage
121
heating medium gas
120
raw material

FIG. 2

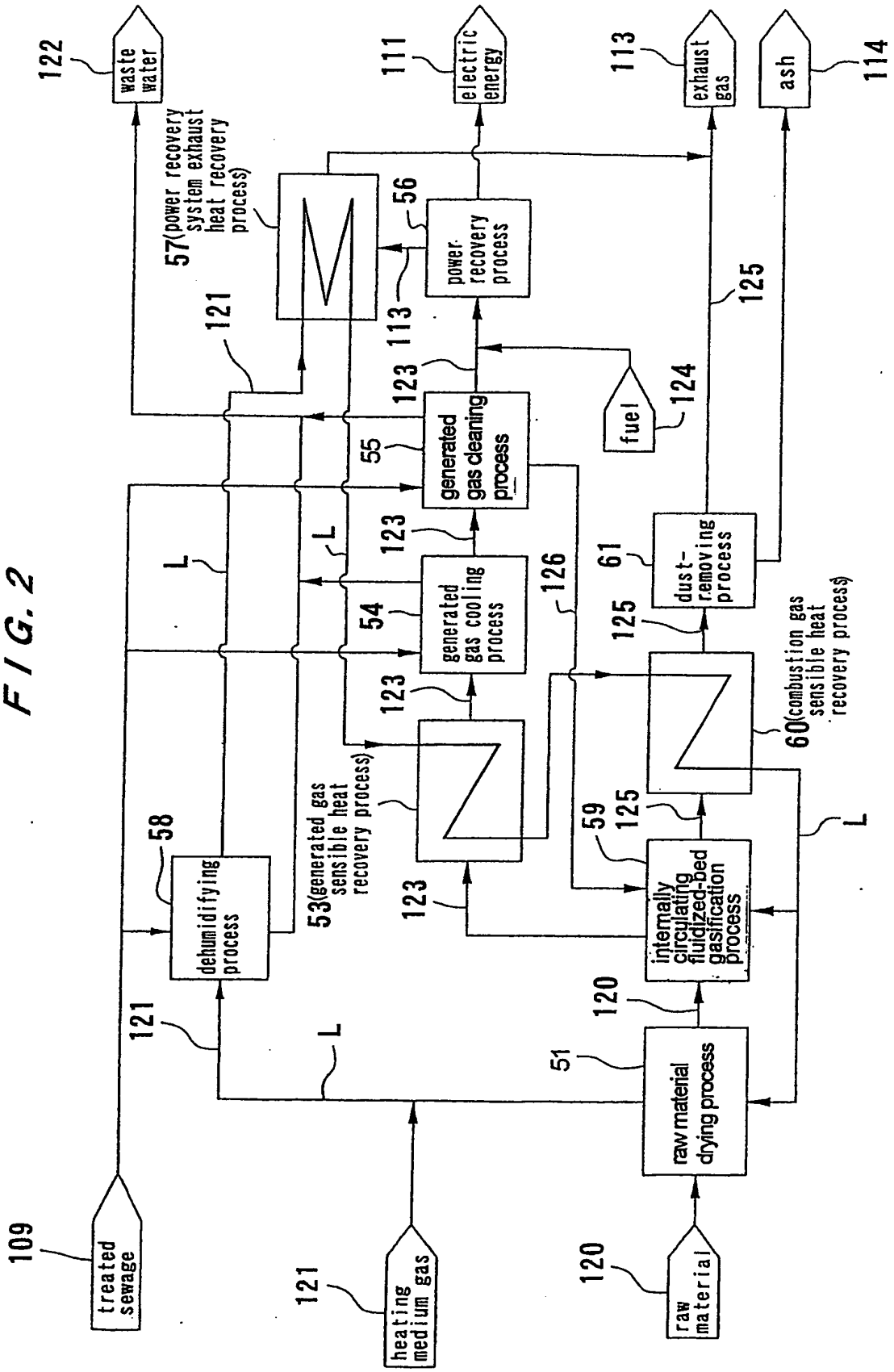

109
treated sewage
121
heating medium gas
120
raw material
waste water
122
electric energy
111
exhaust gas
113
ash
114
fuel
124
dehumidifying process
58
raw material drying process
51
internally circulating fluidized-bed gasification process
59
generated gas cooling process
54
generated gas cleaning process
55
power recovery process
56
dust-removing process
61
53(generated gas sensible heat recovery process)
57(power recovery system exhaust heat recovery process)
60(combustion gas sensible heat recovery process)
L
123
125
126

FIG. 3A

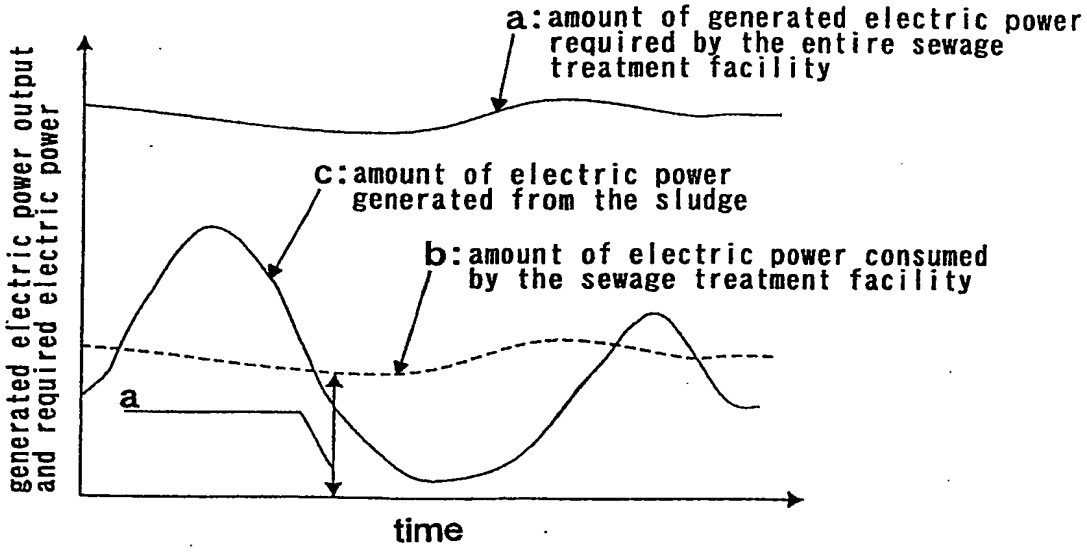

a: amount of generated electric power required by the entire sewage treatment facility
c: amount of electric power generated from the sludge
b: amount of electric power consumed by the sewage treatment facility
a
generated electric power output and required electric power
time

FIG. 3B

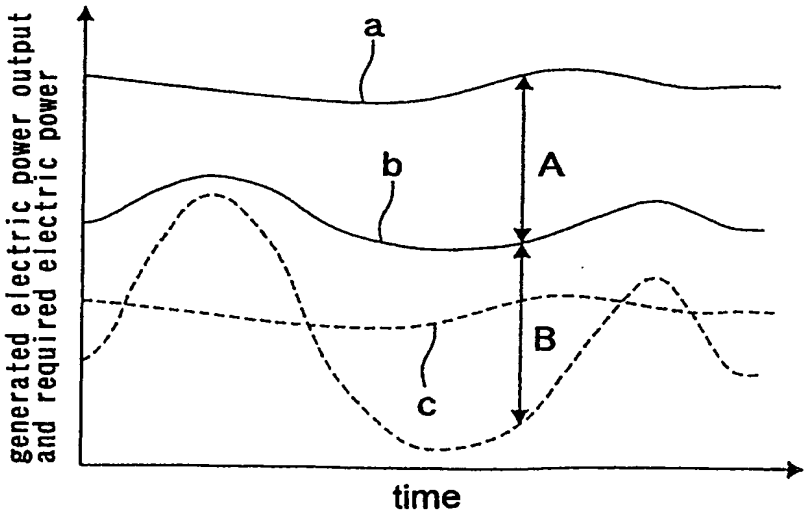

a
b
A
B
c
generated electric power output and required electric power
time

FIG. 4

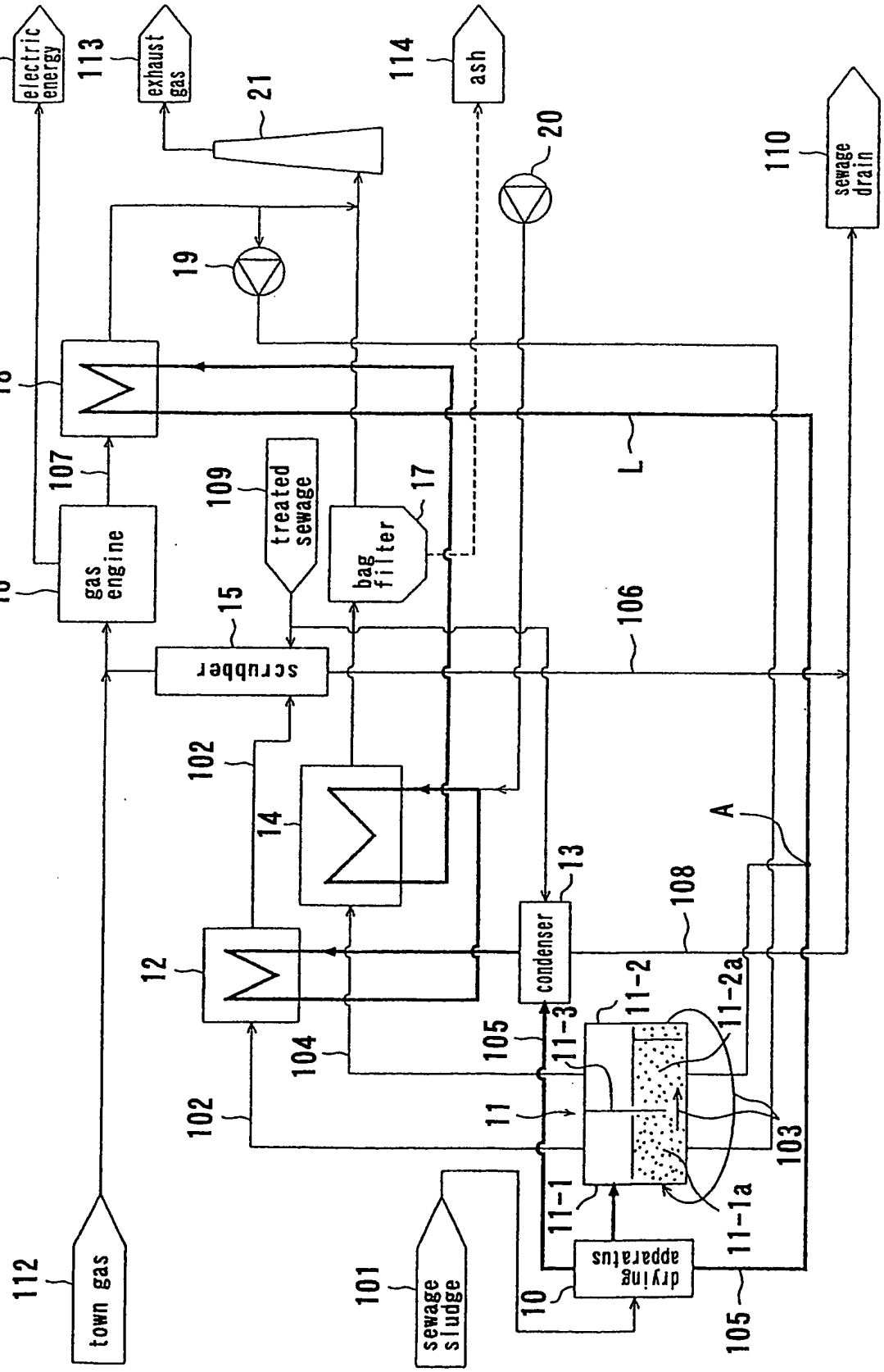

111
electric energy
113
exhaust gas
114
ash
110
sewage drain
21
20
19
18
107
109
treated sewage
17
bag filter
L
16
gas engine
15
scrubber
106
102
14
A
13
condenser
108
12
11-2
11-2a
104
105
11-3
11
103
11-1
11-1a
112
town gas
101
sewage sludge
10
drying apparatus
105

FIG. 5

water	%-wb	77.0%
carbon	%-wb	9.8%
hydrogen	%-wb	1.4%
oxygen	%-wb	5.6%
nitrogen	%-wb	1.2%
sulfur	%-wb	0.2%
ash	%-wb	4.8%
higher calorific value	MJ/kg	4.37
	kcal/kg	1043.0
lower calorific value	MJ/kg	2.12
	kcal/kg	505.4
lower calorific value (exclusive of a value of combusted hydrogen)	MJ/kg	2.43
	kcal/kg	581.0

FIG. 6

treatment amount of sewage sludge	t/d	300						
water contents of dried sewage sludge	%	15%	20%	25%	30%	35%	40%	45%
higher calorific value	MJ/kg	16.1	15.2	14.2	13.3	12.3	11.4	10.4
the same as above	kcal/kg	3,855	3,628	3,401	3,174	2,948	2,721	2,494
lower calorific value	MJ/kg	14.6	13.6	12.6	11.6	10.6	9.6	8.6
the same as above	kcal/kg	3,485	3,245	3,005	2,764	2,524	2,284	2,043
gas engine electric power generation efficiency	%	35%	35%	35%	35%	35%	35%	35%
gasification furnace raw material heat input (higher calorific value)	MW	15.2	15.2	15.2	15.2	15.2	15.2	15.2
cold gas efficiency	%	64%	61%	58%	55%	50%	45%	39%
generating-end output	MW	3.40	3.26	3.10	2.91	2.68	2.40	2.06
required gas engine heat radiation recovery ratio	MW	61%	56%	50%	42%	32%	16%	−8%

FIG. 7

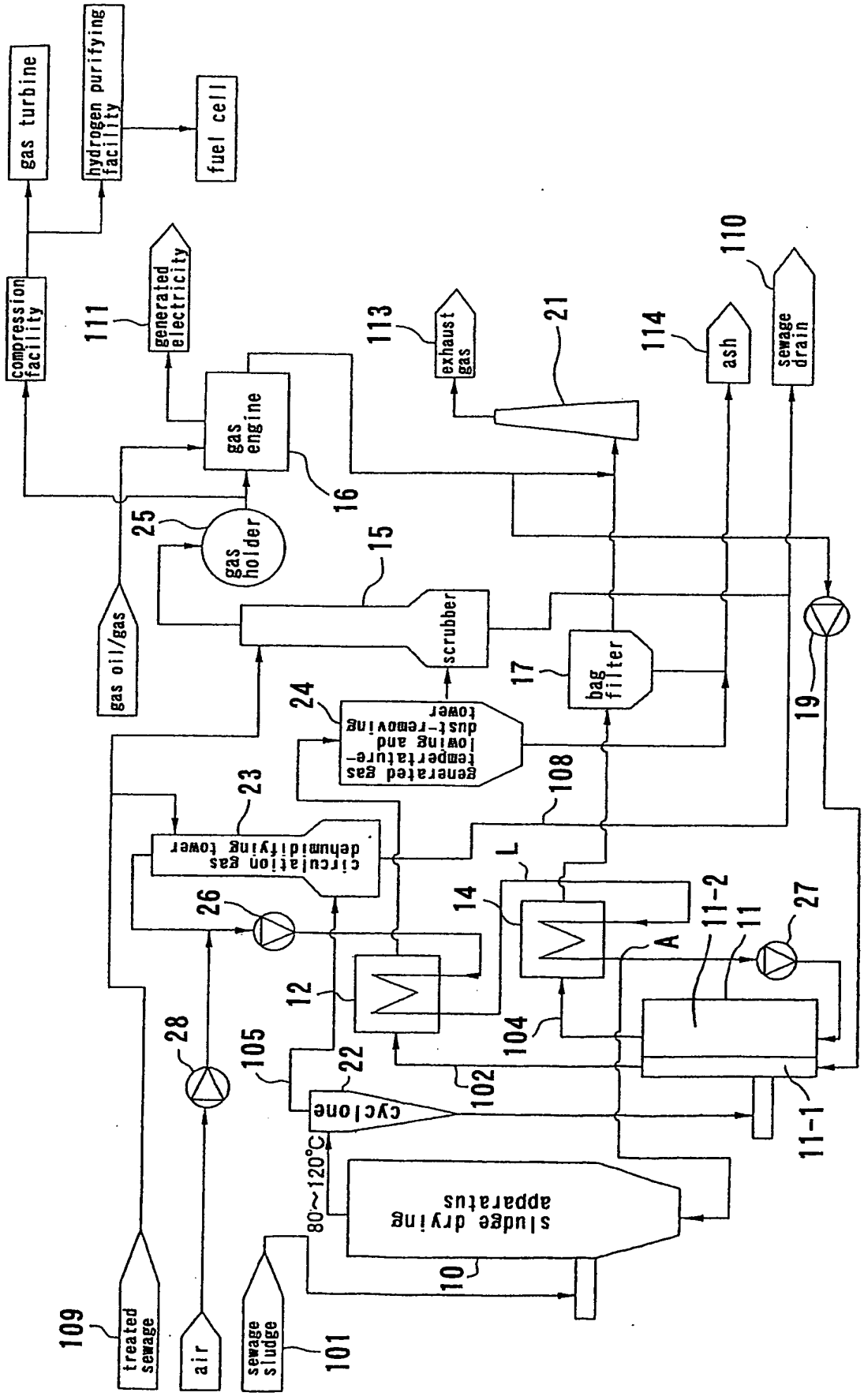
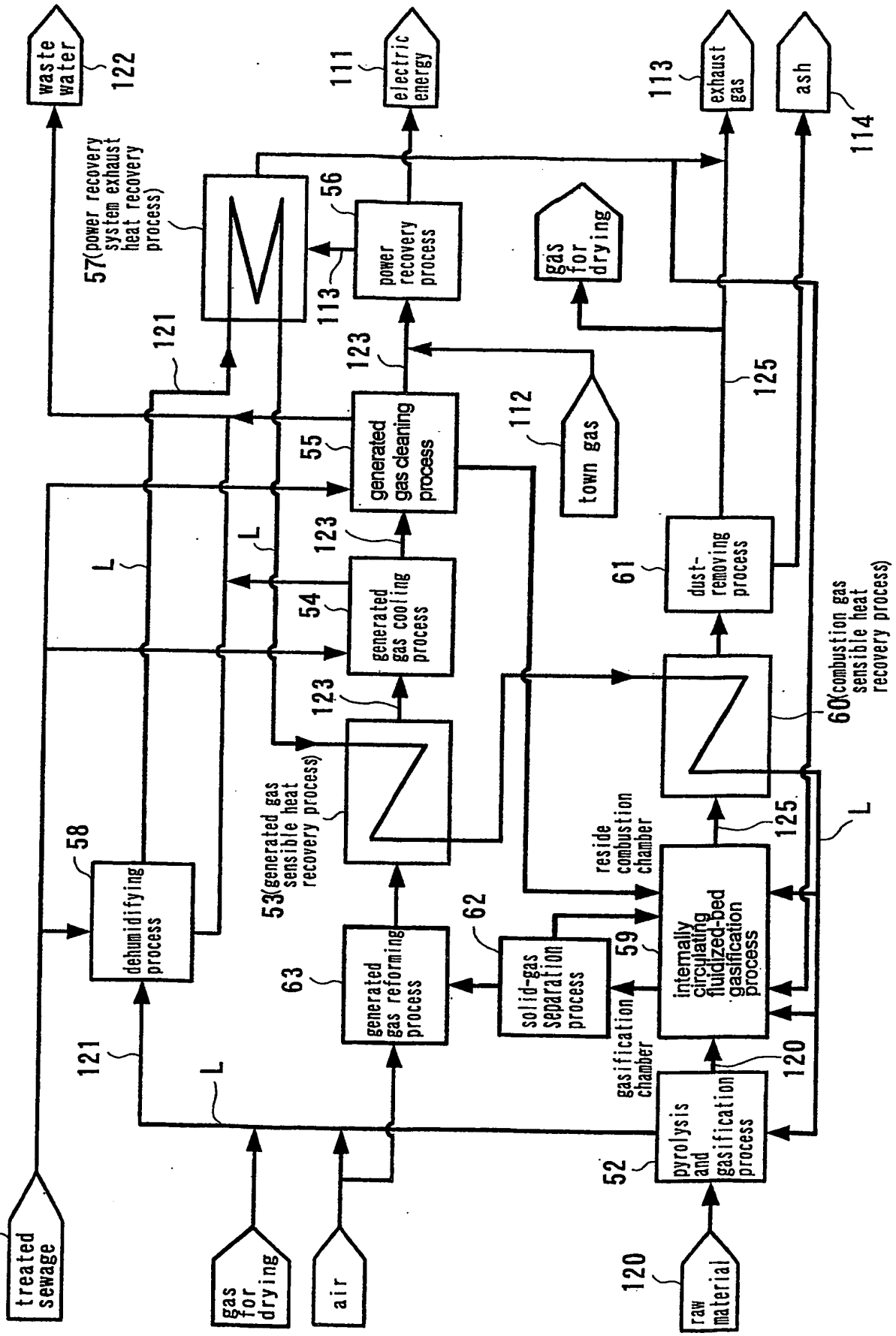

gas turbine
hydrogen purifying facility
fuel cell
compression facility
111
generated electricity
113
exhaust gas
21
114
ash
110
sewage drain
gas engine
16
25
gas holder
15
scrubber
gas oil/gas
17
bag filter
19
24
generated gas temperature-lowing and dust-removing tower
23
circulation gas dehumidifying tower
108
L
26
14
A
11-2
11
27
12
104
28
105
22
cyclone
102
11-1
80~120°C
sludge drying apparatus
10
109
treated sewage
air
sewage sludge
101

FIG. 8


waste water
122
electric energy
111
exhaust gas
113
ash
114
57 (power recovery system exhaust heat recovery process)
56
power recovery process
113
gas for drying
121
123
generated gas clearing process
55
112
town gas
125
L
123
generated gas cooling process
54
61
dust-removing process
123
60 (combustion gas sensible heat recovery process)
53 (generated gas sensible heat recovery process)
58
dehumidifying process
reside combustion chamber
125
L
62
63
generated gas reforming process
solid-gas separation process
59
internally circulating fluidized-bed gasification process
121
L
gasification chamber
120
109
treated sewage
gas for drying
air
52
pyrolysis and gasification process
120
raw material